

REMARKS

This is a full and timely response to the final Office Action mailed by the U.S. Patent and Trademark Office on July 11, 2006. Claims 1-9 remain pending in the present application. Claims 10-19 are withdrawn. In view of the following remarks, reconsideration and allowance of the application and claims are respectfully requested. Each rejection presented in the Office Action is discussed in the remarks that follow.

Rejection Under 35 U.S.C. § 102

Claims 1-9 stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U. S. Patent No. 6,711,195 to Chang *et al.* (hereafter *Chang*). A proper rejection of a claim under 35 U.S.C. § 102 requires that a single prior art reference disclose each element of the claim. *See, e.g., W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983). Anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. *See, e.g., In re Paulsen*, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); *In re Spada*, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Alternatively, anticipation requires that each and every element of the claimed invention be embodied in a single prior art device or practice. *See, e.g., Minnesota Min. & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992). The test is the same for a process. Anticipation requires identity of the claimed process and a process of the prior art. The claimed process, including each step thereof, must have been described or embodied, either expressly or inherently, in a single reference. *See, e.g., Glaverbel S.A. v. Northlake Mkt'g & Supp., Inc.*, 45 F.3d 1550, 33 USPQ2d 1496 (Fed. Cir. 1995). Those elements must either be inherent or disclosed expressly. *See, e.g., Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); *Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987). Those elements must also be arranged as in the claim. *See, e.g., Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989); *Carella v. Starlight Archery & Pro Line Co.*, 804 F.2d 135, 231 USPQ 644 (Fed. Cir. 1986). For anticipation, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. *See, e.g., Scripps Clinic & Res. Found. v. Genentech, Inc.*, 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991).

Accordingly, the single prior art reference must properly disclose, teach or suggest each element of the claimed invention.

It is alleged in the Office Action that *Chang* discloses:

a light-emitting device, comprising:
an active region (104, Fig. 5) configured to generate light in response to injected charge; and
a current confinement structure (*a portion of DBR 332, Fig. 5, is etched away to form mesa 338, Fig. 5, the current confinement structure is formed in the mesa Col. 11, line 45-Col. 12, line 35, the current confinement structure extends down to the quantum well layer 116, Fig. 3A, which is part of quantum well structure 106, Fig. 5 of the active region 104*) located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer (*strain compensating layer is barrier layer 118, Fig. 3A, which is a part of layer 106, Fig. 5 and Col. 9*).

Regarding claim 2, *Chang* further discloses the light-emitting device of claim 1, in which the current confinement structure comprises an additional strain compensating layer adjacent the oxide-forming layer (fig. 5 and Cols. 7-8), where the oxide-forming layer is sandwiched between the strain compensating layers.

As mentioned in the previous response, *Chang* discloses a semiconductor device structure that includes a strain-compensated active region. Specifically, *Chang* discloses that “[t]he strain compensation provided between the quantum-well layer 116 and the material of the substrate 102 by many of the barrier layer materials described above enables a quantum-well structure that includes many quantum-well layers to be fabricated with an acceptably-low density of defects, notwithstanding the lattice mismatch between the GaAsSb or InGaAsSb of the quantum well layers and the semiconductor substrate 102.” *See Chang*, col. 10, lines 25-33.

The structure in *Chang* defines the strain compensating layers as sandwiching the quantum-well layer and does not show any strain compensating layer adjacent an oxide-forming layer. Specifically, *Chang* states that “[i]n the example shown, the quantum-well structure 106 is composed of the single quantum-well layer 116 sandwiched between the substrate-side barrier layer 114 and the remote-side barrier layer 118.” *See Chang*, col. 10, lines 16-19. *Chang* then goes on to mention that multiple quantum-well layers may be sandwiched between multiple barrier layers. *Chang* also states that “[t]he lattice constant of GaP is less than the lattice constant of GaAsSb, GaAs and InP. Accordingly, InGaP having

an indium fraction y less than a third threshold can provide strain compensation between the quantum-well layer 116 and the substrate 102 when the substrate material is GaAs or InP.”

See Chang, col. 8, lines 10-15.

Importantly, *Chang* fails to disclose, teach or suggest at least “a current confinement structure located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer,” as recited in claim 1.

Applicants respectfully disagree with the statement in the Office Action that *Chang* discloses “a current confinement structure (*a portion of DBR 332, Fig. 5, is etched away to form mesa 338, Fig. 5, the current confinement structure is formed in the mesa Col. 11, line 45-Col. 12, line 35, the current confinement structure extends down to the quantum well layer 116, Fig. 3A, which is part of quantum well structure 106, Fig. 5 of the active region 104*) located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer (*strain compensating layer is barrier layer 118, Fig. 3A, which is a part of layer 106, Fig. 5 and Col. 9*).” Applicants respectfully submit that nowhere does *Chang*, in Fig. 5, col. 11, lines 54-67, or elsewhere, disclose, teach or suggest Applicants’ “current confinement structure located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer.”

With regard to the statement in the Office Action that *Chang* discloses “a current confinement structure (*a portion of DBR 332, Fig. 5, is etched away to form mesa 338, Fig. 5, the current confinement structure is formed in the mesa Col. 11, line 45-Col. 12, line 35, the current confinement structure extends down to the quantum well layer 116, Fig. 3A, which is part of quantum well structure 106, Fig. 5 of the active region 104*),” Applicants respectfully submit that the current confinement structure in *Chang* comprises conductive region 348, which clearly exists only in the remote-side DBR 332, and not in the active region 104, and in no manner extends to the quantum well layer 116. Indeed, the conductive region 348 of *Chang* is separated from the quantum well layer 116 by at least the barrier layer 116, the cladding layer 120 and the layer of the remote-side DBR 332 that contacts the cladding layer 120. *See Chang*, FIG. 5 and col. 12, line 8.

Applicants also respectfully disagree with the statement in the Office Action that *Chang* discloses “a strain compensating layer adjacent an oxide-forming layer (*strain compensating layer is barrier layer 118, Fig. 3A, which is a part of layer 106, Fig. 5 and Col. 9*).” Applicants respectfully submit that nowhere does *Chang* disclose, teach or suggest at least “a current confinement structure located to direct charge into the active region and

including a strain compensating layer adjacent an oxide-forming layer,” as recited in claim 1.

Applicants respectfully submit that while the remote side distributed Bragg reflector 332 in *Chang* includes a high-aluminum fraction AlGaAs layer 346 and includes a conductive region 348 resulting after oxidation of the high-aluminum fraction AlGaAs layer 346, nowhere does *Chang* disclose, teach or suggest at least “a current confinement structure located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer,” as recited in claim 1.

Indeed, the high-aluminum fraction AlGaAs layer 346 of *Chang* is separated from any strain compensating layer in the active region 104 by at least an intervening layer (not numbered) in the DBR 332. Further, assuming that the layer 334 of higher refractive index material and the layer 336 of lower refractive index material constituting an exemplary layer pair in the substrate-side DBR 330 is representative of the layer pairs of the remote-side DBR 332, neither of the layers 334 or 336 are described by *Chang* as strain compensating.

While *Chang* discloses a conductive region 348 (*See Chang*, col. 12, line 8) and strain compensation provided between the quantum-well layer 116 and the material of the substrate 102 (*See Chang*, col. 10, lines 25-26), these concepts and related structures are disclosed in different structural portions of the device in *Chang*. Specifically, the conductive region 348 is part of the remote-side DBR 332, and the strain compensation is provided *only* within the quantum-well structure 106, and specifically between the quantum-well layer 116 and the barrier layers 114 and 118. The quantum-well structure 106 is separated from the high-aluminum fraction AlGaAs layer 346 by an intervening layer in the DBR 332 and by an intervening layer (cladding layer 120, Fig. 3A of *Chang*) in the active layer 104. *See Chang*, col. 10, lines 16-32, and FIG. 5.

Applicants also respectfully disagree with the statement in the Office Action that:

Regarding claim 2, *Chang* further discloses the light-emitting device of claim 1, in which the current confinement structure comprises an additional strain compensating layer adjacent the oxide-forming layer (fig. 5 and Cols. 7-8), where the oxide-forming layer is sandwiched between the strain compensating layers.

Applicants respectfully submit that nowhere does *Chang*, in Fig. 5, cols. 7-8, or elsewhere, disclose, teach or suggest Applicants’ device “in which the current confinement structure comprises an additional strain compensating layer adjacent the oxide-forming layer, where the oxide-forming layer is sandwiched between the strain compensating layers,” as recited in claim 2.

As stated above, *Chang* fails to disclose, teach or suggest a current confinement structure including a strain compensating layer adjacent an oxide-forming layer.

Applicants' Response To The Office Action's Response to Arguments

Applicants respectfully disagree with the Office Action's interpretation of *Chang* that "the current confinement structure extends from the mesa 338, Fig. 5 to the quantum well layer 116, Fig. 3A of the active region 104. Therefore, the current confinement structure includes the barrier layer 118, Fig. 3A, which Applicant concedes is a strain compensating layer."

Applicants' independent claim 1 recites "a current confinement structure located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer."

The conductive region 348 in *Chang* is clearly shown as resulting from oxidation of the high-aluminum fraction AlGaAs layer 346. *See Chang*, col. 11, line 54 – col. 12, line 13. The high-aluminum fraction AlGaAs layer 346 is part of the remote-side DBR 332 and is separated from the active region 104 by at least one layer of the remote-side DBR 332. Further, there is nothing in *Chang* to suggest or support the Office Action's interpretation that "the current confinement structure includes the barrier layer 118, Fig. 3A." Even assuming *arguendo* that the Office Action's interpretation of *Chang* is valid, *Chang* fails to disclose, teach or suggest at least "a current confinement structure located to direct charge into the active region and including a strain compensating layer adjacent an oxide-forming layer," as recited in claim 1. Indeed, even if the Office Action's interpretation is correct, *Chang* still fails to disclose, teach or suggest a strain compensating layer adjacent an oxide-forming layer.

Accordingly, Applicants respectfully submit that independent claim 1 is allowable over *Chang*, and furthermore, that dependent claims 2- 9, which depend either directly or indirectly from allowable independent claim 1, are allowable for at least the reason that they depend from an allowable independent claim. In re *Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1998).

CONCLUSION

Should the Examiner have any comment regarding the Applicants' response or believe that a teleconference would expedite prosecution of the pending claims, Applicants request that the Examiner telephone Applicants' undersigned attorney.

Respectfully submitted,

Smith Frohwein Tempel Greenlee Blaha LLC
Customer No. 35856

By:



Michael J. Tempel
Registration No. 41,344
(770) 709-0056